JPL

Team Exercise
Objectives, Results, and Clear Flags

Michael R. Gunson
Jet Propulsion Laboratory
Michael.Gunson@jpl.nasa.gov
818 354 2124

Assumptions and Pre-Exercise Status

- Retrieval bias was not to be resolved in the exercise but pursued in parallel
- Algorithm performance not the primary objective
- Simple bias introduced to the radiances
  - How do we estimate bias given sparse truth?
  - Does the matchup system work?
  - Do our clear flags work?

$$R_{bias} = R + (f1(lat) + f2(z) + f3) * dB/dt$$

Where

f1 is a function of latitude - on the order of .12K or smaller
f2 is a function of peak of weighting function, z - 0/1.02/-2.34 at 1000/100/0.5 mb
f3 is a pseudo random number with sigma 0.05
and dB/dt is the derivative of the Plank function at 250K.

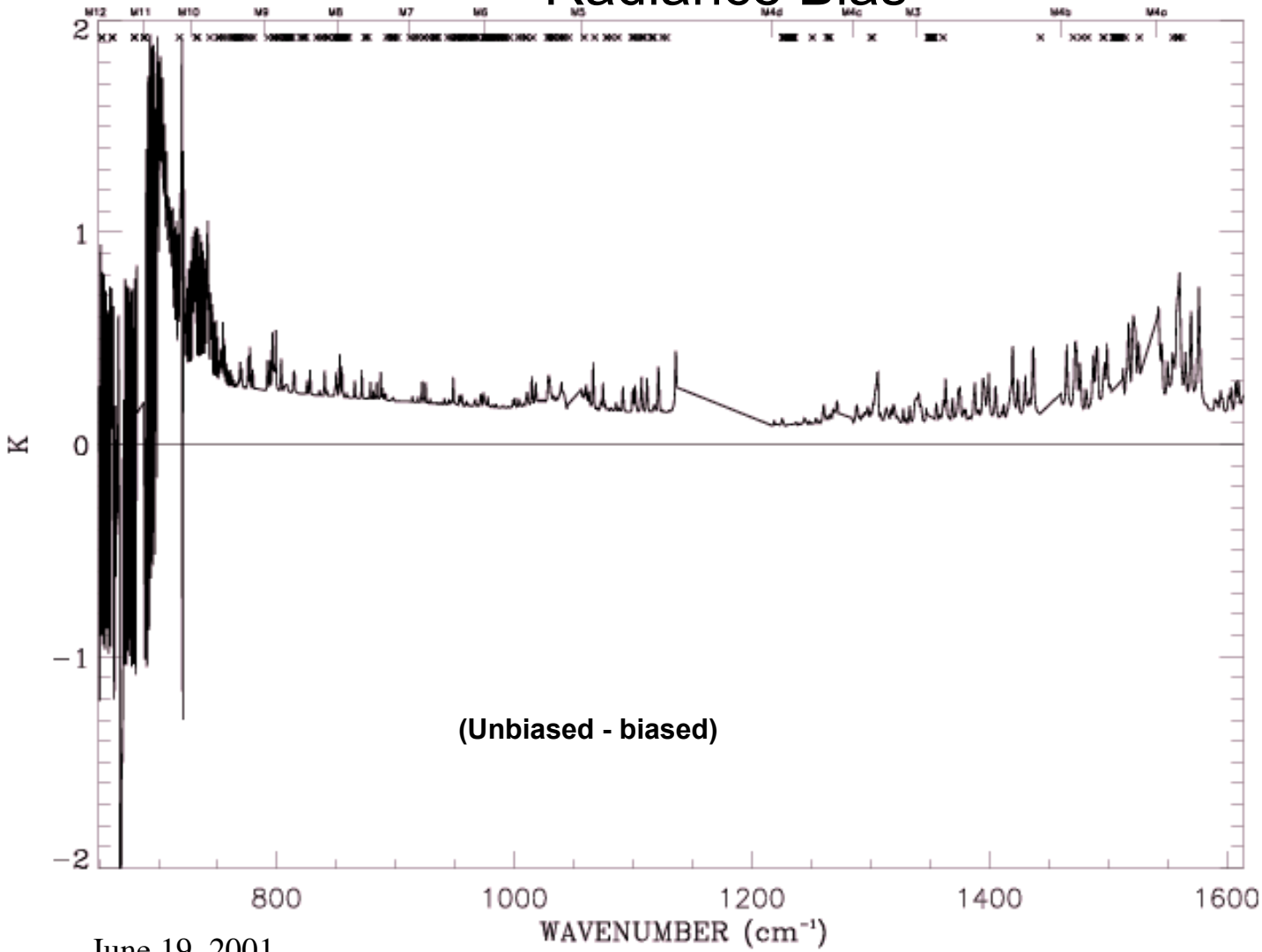
Team Exercise Objectives

- **Tuning**
  - Determine radiance bias statistics based on cloud-cleared radiances for 12/15/2000 and radiances calculated using a new AVN forecast as "Truth"
  - Determine bias correction/Tuning coefficients
  - Apply and assess impact of Tuning coefficients on retrieved state

Delayed - new code being developed

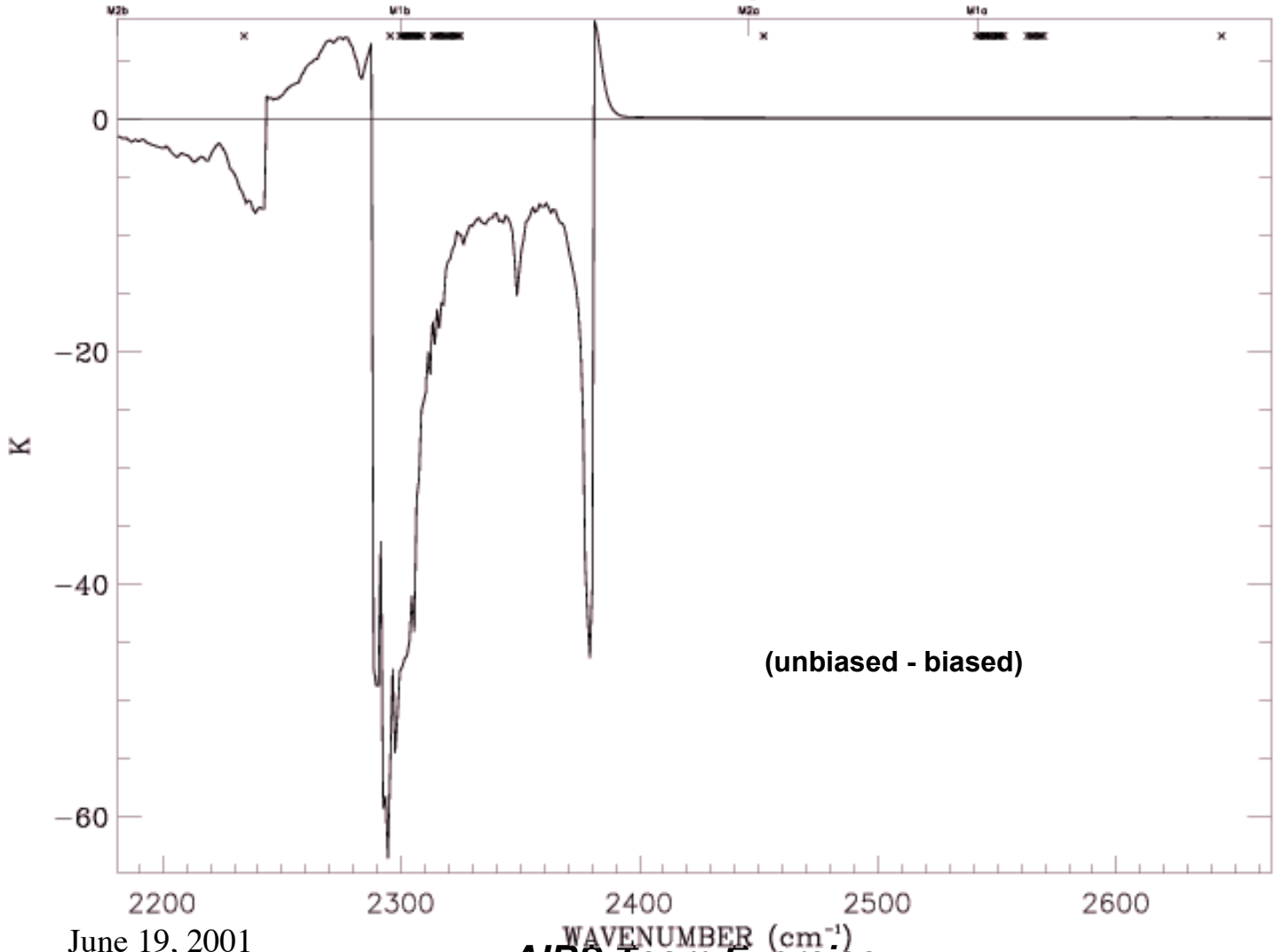
- **Matchup Process**
  - Create matchup files for all critical validation data types.
  - Verify and validate matchup file contents and format.
  - Reprocess L2 products in matchup files using new L2_PGE capability
  - Utilize AIRS_REF_RTA in addition to RTA in computing matrchup radiances
  - Generate radiance bias statistics for matchups
  - Generate T and q difference statistics for RaObs matchups
  - Generate T-surface difference statistics for buoy matchups
  - Recover radiance bias from available data and compare
  - Compare clear sky detection results

Radiance Bias



(Unbiased - biased)

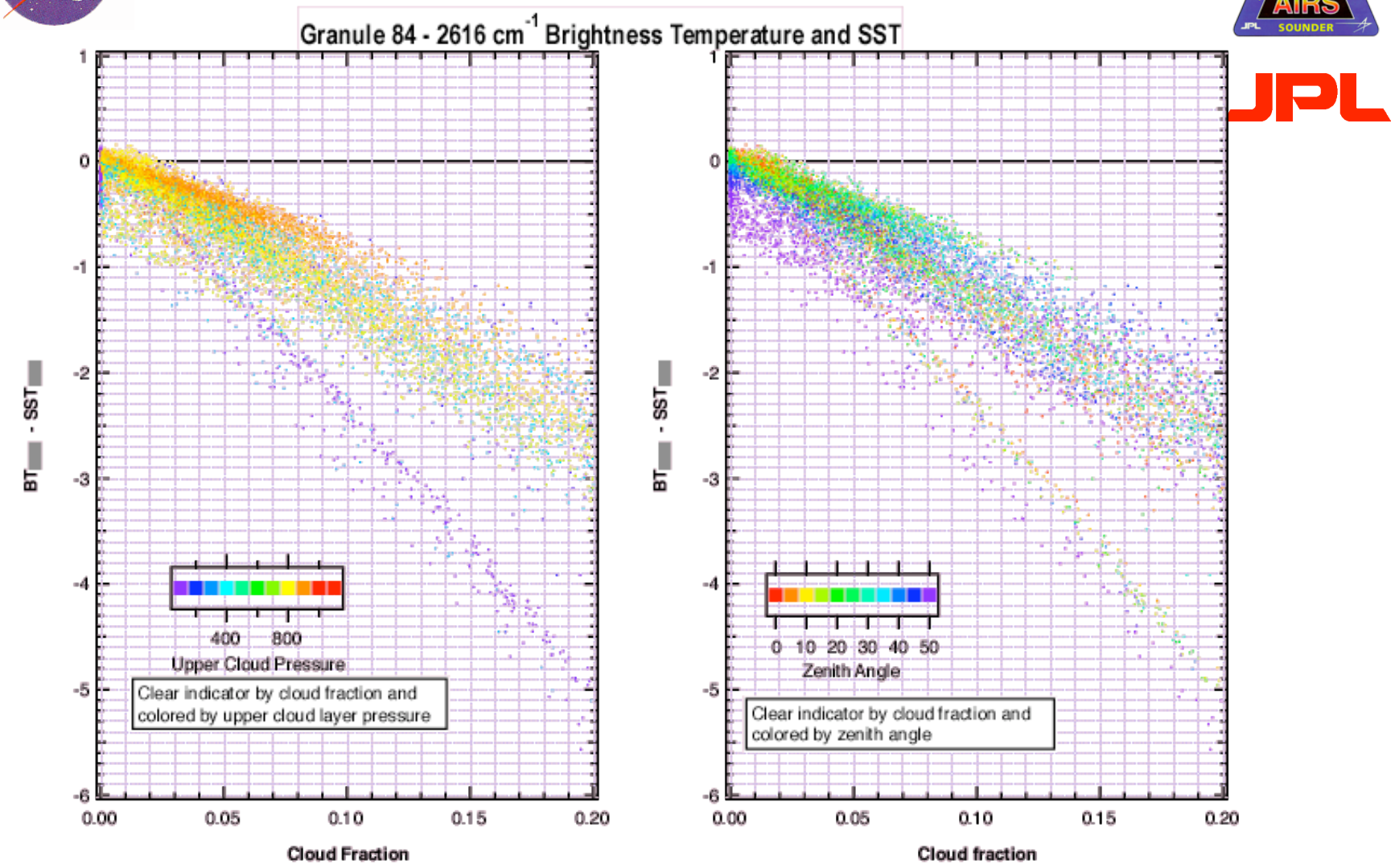
Oooops



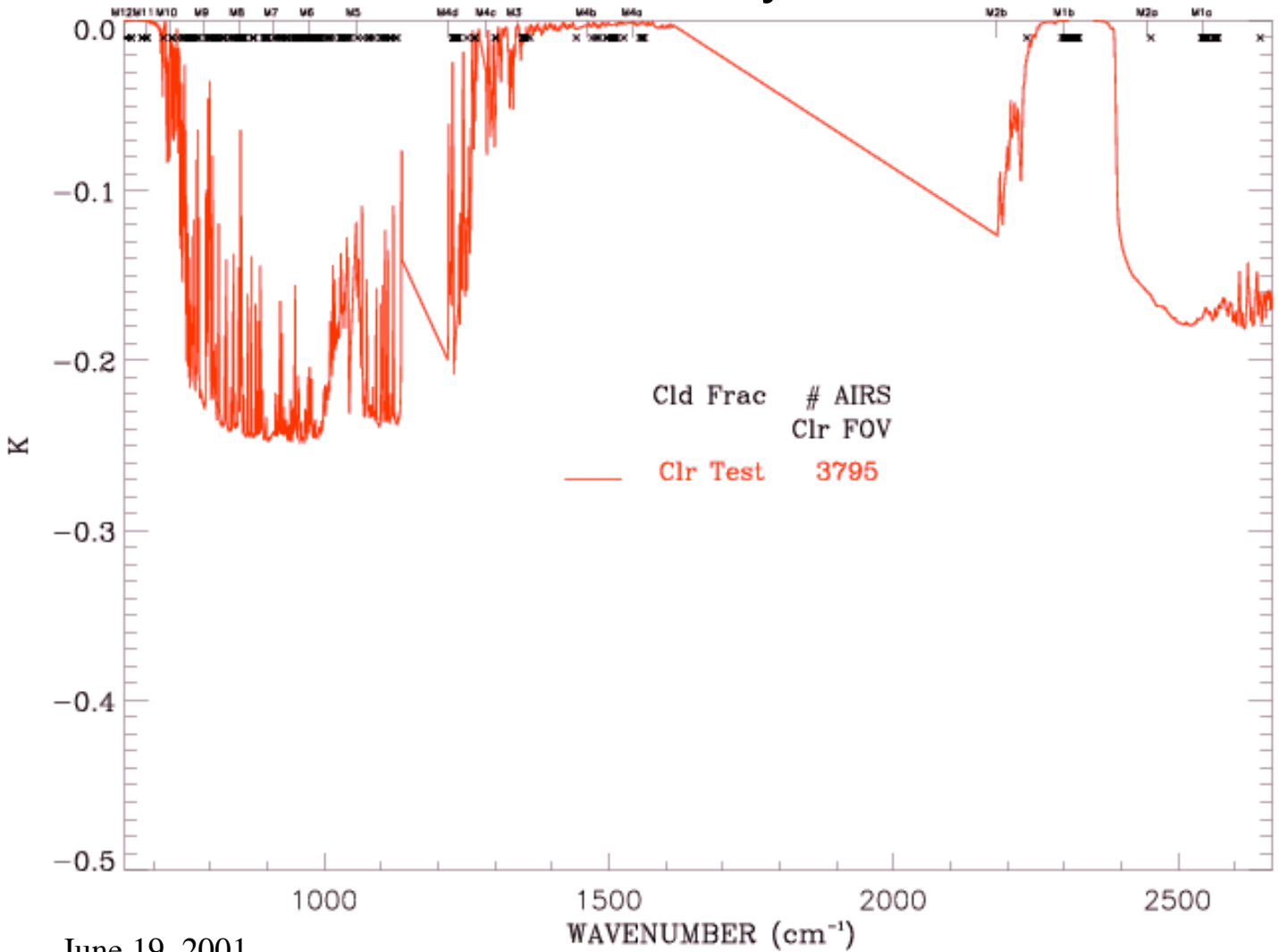
(unbiased - biased)

Clear Flags

- How do we start when the instrument stabilizes and we get the first semi-calibrated radiances? ***Bootstrapping.***
  - Must have method of identifying an agreed upon set of “clear” radiances to initiate first bias estimate
  - Will involve using window channels at short and long-wavelength but perforce must start with simplest (least dependent on water vapor)
    - Sea surface temperature estimate compared to brightness temperature at 2616 cm^{-1} at night in tropical/sub-tropical regions
    - Extend with 900 cm-1 channels and regression for day observations


Granule 84 - 2616 cm-1 Brightness Temperature and SST
BT - SST
Cloud Fraction
400 800
Upper Cloud Pressure
Clear indicator by cloud fraction and colored by upper cloud layer pressure
0 10 20 30 40 50
Zenith Angle
Clear indicator by cloud fraction and colored by zenith angle
Cloud fraction

Radiance Bias by Clear Test



Radiance Bias by Clear Test (<2 % clouds)